Alternative Fuel School Buses: View for Fleet Managers

Outline of Presentation

- What Are Alternative Fuels?
- Why Do We Need Alternative Fuels?
- Alternative Fuel School Buses at Work Across America
- Bus Types and Available Products
- What are the Benefits and Costs of Alternative Fuel Use?
- Are They Safe?
- Funding Sources for Alternative Fuel Projects
- Training for Drivers and Mechanics
- For More Information

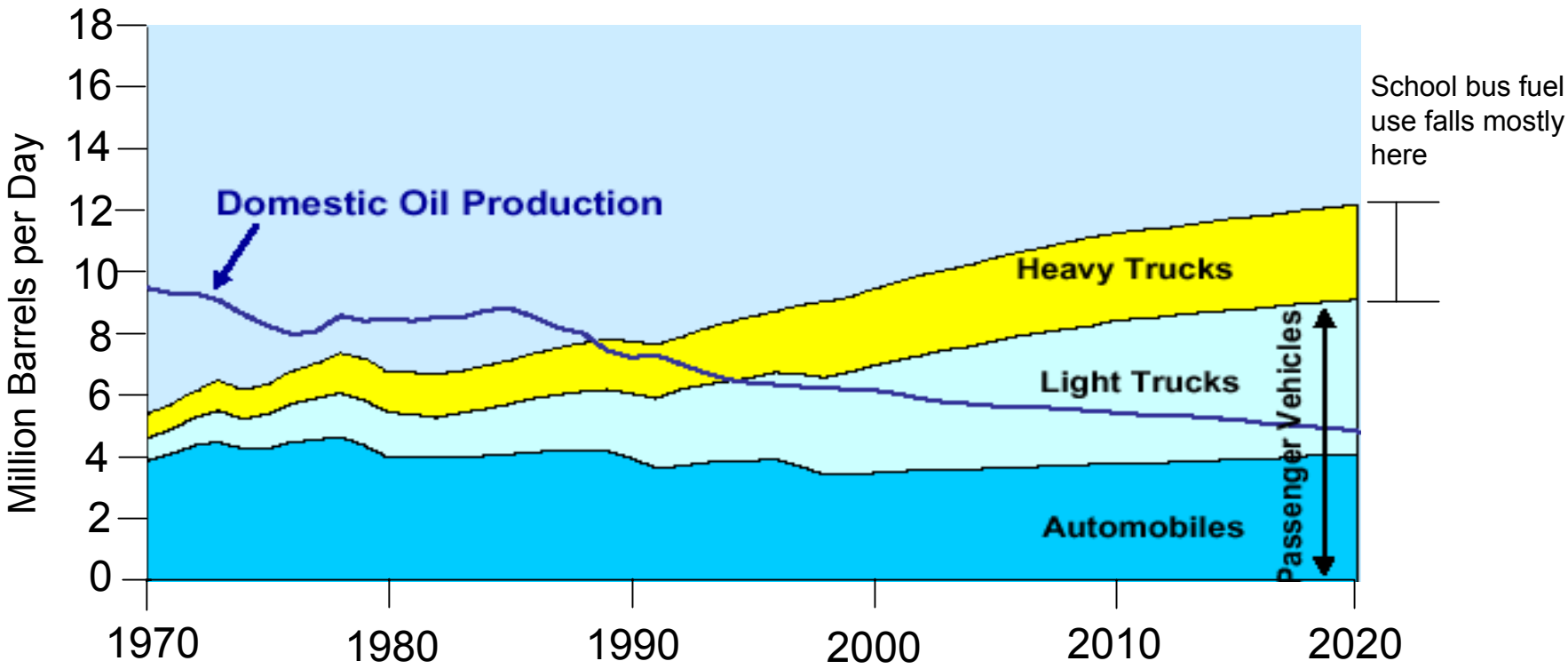
What Are Alternative Fuels?

- "Alternative Fuel" refers to vehicle fuels other than gasoline or diesel. For example,
  - Natural Gas
  - Propane
  - Ethanol
  - Biodiesel
  - Electricity
  - Hydrogen

Why Do We Need Alternative Fuels?

- Reduce American Use of Petroleum Fuels
  - Over half of U.S. transportation petroleum use is imported
  - In some states, imported petroleum use for transportation is as high as 85%
  - Price spikes for petroleum fuels can affect operations of school bus fleets, with potential interruptions in service

U.S. Highway Transportation Uses More Oil Than is Produced Domestically



Source: Transportation Energy Data Book: Edition 18; DOE/ORNL-6941, September 1998, and EIA Annual Energy Outlook 1999, DOE/EIA-0383(99), December 1998

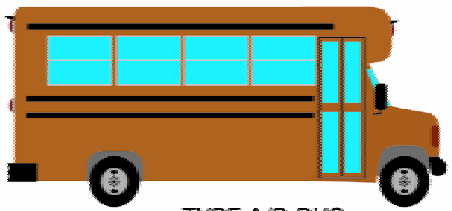
Why Do We Need Alternative Fuels?

- Reduce Exhaust Emissions from Transportation Sources
  - Many regions of the U.S. are facing significant air quality attainment issues and attendant health impacts as populations grow
  - Alternative fuel vehicles usually have better emissions performance than equivalent conventional fuel vehicles
  - School buses are very visible in the community, and cleaner is better

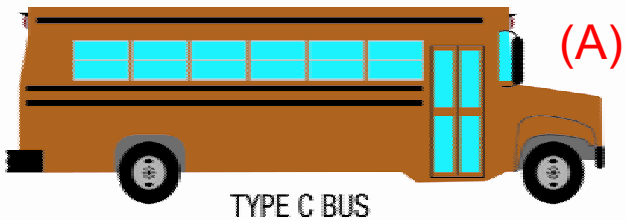
Alternative Fuel Buses Are at Work Throughout America

- Currently over 2,500 alternative fuel school buses in U.S.
  - 21 states across the U.S. in a wide range of applications and climates
  - Natural gas, propane, biodiesel
  - Displacing 4-5 million gallons of petroleum each year

Types of School Buses

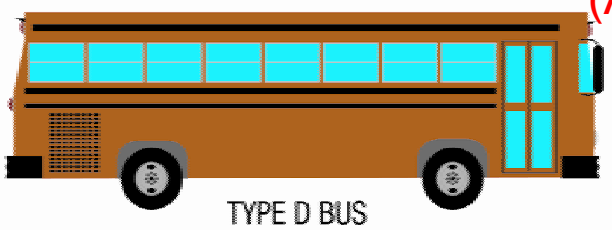


Small cutaway on van-type chassis, up to 12,000 lb GVW (Type A) or 14,500 lb (Type B)



(A)

Conventional bus on medium-duty truck chassis, up to 31,000 lb GVW



(A)

Transit-style bus on medium-duty truck chassis, up to 36,000 lb GVW

(A) = Alternative Fuel Option Available

What Products Are Available?

	Compressed Natural Gas		*Propane*	
	OEM	*Conversion* [1]	*OEM*	*Conversion*
Type A	-[5]	Yes [3]	-	Yes [3]
Type B	-	Yes [3]	-	Yes [3]
Type C	Future [4]	Yes [3]	Yes [2]	Yes [3]
Type D	Yes	Yes [3]	-	Yes [3]

[1] Conversions need to be EPA Certified Conversions under Memorandum 1A
[2] This propane bus is actually a "technology enhanced aftermarket model" available through OEM bus manufacturers
[3] Depending on vehicle platform and engine type
[4] A natural gas Type C bus may become available in the next few years.
[5] A Type A OEM bus product had been available through 2004 but was discontinued: cutaway van products are still being produced, but safety certifications for school bus use have not been performed on these products.

Biodiesel blends can be used in most diesel vehicles in blends to 20 percent: check with manufacturer for guidelines.

EPA Memorandum 1A Conversions

- EPA regulates alternative fuel vehicle conversions under the anti-tampering provisions of the Clean Air Act.
- The EPA's Memorandum 1A allows conversions to take place if there is a "reasonable basis" to believe the conversions do not worsen vehicle emissions.
- Conversion systems need to be certified under either California or Federal testing regulations

Available Products-Type C

- Corbeil Bus
  - Conventional bus on GM Family-2 commercial chassis
  - Dedicated propane 8.1 liter engine (EPA and CARB certified)
  - Up to 50 gallons propane storage
  - Up to 72 passengers capacity

Available Products-Type D

- Blue Bird
  - All-American Rear Engine, Dedicated CNG
  - John Deere 8.1 Liter Engine
  - Up to 84 passengers
  - Incremental cost of ~$30,000 to $40,000
- Thomas
  - Saf-T-Liner HDX Rear Engine, Dedicated CNG
  - John Deere 8.1 Liter Engine
  - 66-90 Passengers
  - Incremental cost of ~$30,000

Benefits and Costs of Using Alternative Fuels

- Natural Gas Buses
  - Fuel can be as much as 40 cents per gallon equivalent cheaper; local prices vary
  - Some school systems are saving between 12 and 20 cents per mile with natural gas buses
  - Maintenance costs are usually lower than for diesel
  - Possibility for significant emission reductions relative to current diesel engines (especially particulates and NOx)
  - Many operators comment on quieter operation of natural gas buses
  - Many areas already have natural gas refueling in place; school system can cooperate with other districts and local governments to share refueling sites
  - Buses cost ~$30,000 more than conventional buses
  - Refueling infrastructure costly (starting around $250,000); price highly dependent on speed and volume refueling requirements

Benefits and Costs of Using Alternative Fuels (cont.)

- Biodiesel Blends
  - Can be used with existing vehicles: no vehicle incremental costs
  - Can use existing diesel refueling infrastructure
  - Fuel widely available
  - Fuel can cost 10-20 cents more per gallon (if used in 20% blend with regular diesel)
  - Some increased maintenance (fuel filters), especially during first months of use
  - Significant particulate matter emission reductions from diesel engines
- Propane
  - Fuel cost dependent on area suppliers (can be more or less than diesel)
  - Vehicle cost ~$30,000 more (estimated): most propane buses are conversions of Type C buses
  - Refueling infrastructure not as expensive as natural gas, and many areas already have propane refueling available
  - Maintenance costs lower than for diesel (e.g. increased oil change intervals)
  - Notable emission reductions relative to current diesel engines
  - Savings of as much as $1,335 per vehicle per year have been seen by propane bus fleets

Are Alternative Fuel School Buses Safe?

- School buses are one of the safest modes of transportation on the highway: alternative fuels don't significantly impact this safety
- No known school bus fatalities have resulted from an alternative fuel system
- Alternative fuel school buses meet all conventional bus safety standards plus additional safety standards for alternative fuels (tank safety cages, etc.)

Funding Sources for Alternative Fuel Vehicle Projects

- DOE Clean Cities State Energy Program Special Projects
  - Can fund incremental cost of vehicles and cost of refueling stations
  - Work with local Clean Cities Program to submit grant requests for projects
  - SEP is a competitive solicitation offered yearly
  - SEP School Bus Application Template available at http://www.ccities.doe.gov/pdfs/bustutor.pdf
- Congestion Mitigation and Air Quality (CMAQ) funding
  - Available through local planning organizations, administered by state DOT
  - Availability for alternative fuel projects varies by state
- State funds
- Local government funds
- Foundation funds
- Partnering with fuel providers to offset infrastructure costs or to reduce maintenance and operational costs or fuel costs

Alternative Fuel Vehicle Training

- Drivers and mechanics will need training for operation and maintenance of vehicles
- Training can be available from vehicle manufacturer
- Training for mechanics also available through National Alternative Fuels Training Consortium
  - Branches at colleges throughout most areas of U.S.
  - Onsite training also available for larger groups
  - Trained personnel eligible for certification

In Summary

- Proven technology in use nationwide
- Reduce local dependence on imported petroleum
- Schools are a "better neighbor"
  - Lower emissions (visible and odor): important for areas of operation and for student health
  - Buses can be significantly quieter
- Potential for overall cost savings
- Funds available to offset some costs

For More Information

- National Clean Cities Program
  - http://www.ccities.doe.gov
- Natural Gas Vehicle Coalition
  - http://www.ngvc.org
- Propane Vehicle Council
  - http://www.propanevehicle.org
- National Biodiesel Board
  - http://www.nbb.org
- National Alternative Fuels Training Consortium
  - http://naftp.nrcce.wvu.edu
- "Alternative Fuel School Buses Earn High Marks", Alternative Fuel News Volume 5 Number 3
  - http://www.ccities.doe.gov